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56 Printed matter to be taken into account in assessing the patentability:

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DE 34 26 542 C2
LUNKENBEIN, Norbert: Flexible Adjustment to Altered Tariff Agreements, in: etz, Volume 113, 1992, H.8, p. 476-482;
TETTENBORN, Wolfgang: Network Process Control Technique: A Look Back at Interkama 1989. In: Electricity Management, Volume 89, 1990, H.3, S.65-75;
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DE 196 12 776 A1

54 Open Energy Distribution System, Method for Providing Energy Supplies, as well as System Components for this System

57 The present invention relates to a method for providing energy supplies through a combined network (E), to which a plurality of suppliers (P1, P2, ...PN) and consumers (C1, C2, ...CM) are connected, with freely selectable relations between suppliers and consumers, in which supply and reception of given amounts of energy are agreed on between the suppliers and the consumers through data exchange (D) at short intervals, in such a way that each supplier supplies the agreed upon amounts of energy to the combined network and each consumer receives the agreed upon amount of energy; a public energy distribution system for providing energy supplies, as well as system components for this system.

The following information were taken from the documents submitted by the applicant

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Description

The invention relates to a method for providing energy supplies in accordance with the preamble of Claim 1, a public energy distribution system in accordance with the preamble of Claim 2. as well as system components for consumers and suppliers in this system in accordance with the preamble of Claim 3 or of Claim 4.

Currently, energy is supplied to the end consumers independent of the distribution of energy sources, such as coal or fuel oil, almost exclusively through utility monopolies. These alone are authorized and obligated to supply electric energy, heating gas, water, and in part, district heating in an area agreed upon between them and the authorities. Although water does not have anything to do with energy, it is considered as energy following general linguistic usage, likewise heating gas, which is not energy, but is an energy source. At any rate, no fundamental differences can be determined in the manner of distribution and accounting. Currently, the utility companies also often assume the waste disposal of the sewage. This is where the situation is basically different, insofar as there are no national networks for remote disposal. Otherwise, the present invention would also likewise apply thereto.

Within its territory, a utility company is connected to the consumers through a network of supply lines. At least in relation to electrical energy, the utility companies are connected to one another through a combined network. Apart from maintaining a very exact frequency, which can also serve as standard, this combined network contributes to the extensive distribution of energy. At any given moment, no utility company needs to supply as much energy as the consumer connected to it is currently receiving. Even for the average time, no offset need take place at the individual utility company. Individual utility companies distribute only energy, which is obtained through the combined network; others do not have their own consumers and feed only energy to the combined network.

Aside from providing the required amount each time, it is also the task of the individual utility company to ensure a certain quality. Aside from the already mentioned frequency for electric energy as well as the composition of the content for water or heating gas, the voltage or the pressure, as well as the temperature for district heating, should also be mentioned. The means towards this end are, for the long term, the right network design, including the transformers, pumps and intermediate storage, and for the short term, the opening and closing of switches, valves or slides as well as the adjustment of the ratios of transmission or pumping capacities to the actual need.

Another important task is in accounting. Integrating counters are currently available for this at all interfaces. Interfaces are the connections in a house or residence (or a corresponding interface in the commercial area) as well as the transfer point to the next utility company. In the field of electric energy distribution, it is not unusual to switch between different tariffs depending on time or events. A switch-over is then made between different counters. At the same time, certain consumers are often connected or disconnected. In the event of remote control, the control signals for this are usually supplied through the energy distribution network itself. Anyway, the utility companies are connected to one another through a data network.

There are now political efforts, as in the case of the Post Office and the Federal Railways, to abolish the monopoly even among the utility companies and to create a free market in which every end consumer can freely receive from every supplier. The task of the present invention is to create the technical conditions that make this actually possible.

This task is solved according to the invention through a method according to the teaching of Claim 1, an energy distribution system according to the teaching of Claim 2, as well as system components for consumers and suppliers according to the teaching of Claim 3 or 4.

According to the invention, therefore, a common energy distribution system is supposed to be designed, to which all participating suppliers and consumers are connected and onto which a data network is overlaid, through which, in rapid succession or, so to speak, continuously, a given amount of energy is agreed on and provided between a consumer and a supplier selected from among these.

The invention will be further explained in the following. with the help of the attached drawings.

Fig. 1 schematically shows an energy distribution system according to the invention for carrying out the method according to the invention.

Fig. 2 shows a system component according to the invention for a consumer.

Fig. 3 shows a system component according to the invention for a supplier.

The energy distribution system according to Fig. 1 shows a series of suppliers P1, P2, ..., PN, a series of consumers C1, C2, CM. an energy distribution network E. and a data network D.

The energy distribution network E connects all suppliers and all consumers among one another. For the suppliers, the energy flow only goes away from them, and for the consumers, they are directed only to them. Converters (transformers, pumps), reservoirs (pumped storage power stations, gas boilers, water towers), switches, and counters are not drawn here. The energy distribution tracks drawn horizontally here between the suppliers and consumers would more likely have to be drawn above the suppliers in conventional networks. But there is basically no difference between these representations. It is here, in particular, that the invention comes into play. The existing network can be maintained unaltered; new network parts need not be designed differently from the previous ones.

Only the accounting method that data network D serves is different, with data network D being newly added, at least partially. The data network D is shown here in a very simplified manner. The important thing is that every consumer can send messages to every supplier. The suppliers must be able to exchange information among themselves. If, as shown here, the suppliers can also send messages to the consumers, the degree of freedom, and consequently, the possibilities of the network, increases.

With the help of Fig. 2, it will now be described how the method works for one of the consumers, which is C1 here.

For this, consumer Ci uses a system component SC, which exhibits a measuring device M and a communication and control unit CC.

As in conventional systems, the measuring device M measures the amount of energy actually drawn at the moment by the consumer Ci from the Network E and reports this, according to the invention, to the communication and control unit CC. The measurement value, regardless of the location within this system component, is integrated over a certain period or up to a certain amount of energy. When this predefined value has been reached, the communication and control unit CC transmits a message to the selected supplier B through the data network D and sets the integrated value once again to zero.

First, the simplest case of a small consumer must be regarded as consumer Ci. This will have a fixed contract with a certain supplier Pj, as is currently normally the case. He will pay a monthly basic amount regardless of the consumption, and, on top of this, will always pay the same amount per energy unit according to an undivided rate scale regardless of the time. Supplier Pj will leave him his system component SC, as is the case today. The address to which the messages are to be sent through the data network has been programmed in. It is likewise programmed in which amount of energy is to be reported or for which period the quantity of energy received is to be reported. The supplier Pj adds up the amounts of energy reported by consumer C1 and invoices it as usual monthly or annually with the basic amount.

Particularly for small consumers, as is often the case for water heating, and occasionally for space heating, thermal temporary storage is used and the storage medium (in the case of water heating, the water itself) is heated up in slack period by the electric network. A particularly good rate scale will then be offered for this, although this will be valid only at certain times. At these times, which can be permanently programmed in, switch signal RZ is given, by means of which these consumers can be connected. This rate scale will be taken into account in the delivery of the messages of consumer Ci to supplier Rj.

Even if such times are permanently specified and taken into account through an automatic switch in the system component SC, a synchronization of this clock is displayed through the data network D, for which the system component SC must then be able to not only transmit messages but also receive such. But if these technical resources exist, they can also be used for other purposes, for example, in order to always switch over if the load is supposed to be increased just then.

A bigger consumer can, as consumer, have contracts with two or more suppliers, which will enable him, depending on the agreement reached, to freely choose between the suppliers at any time or at certain times. The agreements reached will then be entered through the data network D into the system component SC of the consumer, for example, by means of a chip card of the respective supplier or from the supplier itself. Here, it would make sense if the suppliers distributed their respective updated rate scales to their consumers. It would also make sense to give special offers through the data network D so that individual consumers can be prompted to accept and connect certain devices through a switch signal RQ. Conversely, an inquiry RQ can be started from a washing machine, for example, through the data network D to the supplier as to who offers the required amount of energy at the best price. On the supplier side, offers for a somewhat later period can definitely be made and be accepted and confirmed on the consumer side.

The exchange of data through the data network D must inevitably be normalized in a particular range. If such normalization already exists, it is no longer imperative that a consumer, when agreeing on acceptances through the data network, be limited only to suppliers with whom he had previously entered into an agreement.

It is at this point, at the very latest, that the question of the design of data network D and the data format to be used clearly comes up. At the very least, the development of the technology required here, if not the application, is already very much advanced and is

also currently being given a strong push. For instance, reference is made here to multimedia applications or to automated data acquisition, and accounting of tolled road usage, for instance in accordance with DE 44 25 271 A1, where the question of secure identification, fraud protection, and of the discontinued exchange of data plays an important role everywhere. Furthermore, it is being pointed out that the energy distribution network E is already being used today up to the end consumer for more or less extensive data transmission. It is not lastly due to these already existing technical resources that even the utility companies are pressing very hard for the market of future competitors of the telephone companies that have been government-run up to now. Besides, the question of sponsorship of the data network D does not play any technical role. Even the co-usage of the traditional telecommunication network is readily possible.

At any rate, with regard to the present invention, the system component shown in Fig. 3 for a supplier is basically only a little different from that for a consumer. The entire power engineering side basically remains unchanged. It is ultimately the accounting that changes. Of course, as a result thereof, the technical parameters may be specified differently, from a commercial point of view, and the facilities may also perhaps be designed differently.

The supplier Pj uses a system component SP, which exhibits a measuring device M and a communication and control unit CC.

The measuring device M measures the amount of energy actually fed at the moment into network E by this supplier Pj and reports this to the communication and control unit CC.

Moreover, the communication and control unit CC continuously collects the messages of those consumers who wish to withdraw from this supplier at the moment. The reported amount of energy fed usually varies from the desired amount received. At least as before, there is still the possibility of influencing one's own energy feed through switch commands RQ. As opposed to the current situation, it is also possible to change the rate scale at short notice through the data network D, thereby attracting a few more consumers towards the supplier or away from the supplier. By giving out or withdrawing special offers, consumer devices, such as heaters or washing machines, can be switched on or off or prevented from switching on.

As before, every supplier can also feed energy to the consumers of other suppliers or have energy fed by the others to their own consumers.

Of course, other consumers are also conceivable, with said consumers facing the last consumers in their own names or at their own expense as suppliers, but as consumers towards those feeding energy. Here, it is particularly clear that the amount of energy reported per message through the data network cannot be the same amount for all consumers. The messages or even the inquiries should not follow more closely than is necessary for stable controllability.

In the example of the last-mentioned company, it is also clear that not only the pure energy supplies are to be paid. Even the preparation of the network as well as the transmission losses are to be taken into account. These are not technical questions, however. As far as technology goes, it must only be considered that, in selecting the data network, including the data format and the data protocol, such specifications can actually be met and as simply as possible.

Even political specifications and personal preferences or dislikes that serve to give preferential treatment or are disadvantageous to certain types of energy, regions, or customers must be compatible with the communication and control unit through the data network and the control program. All these, however, are non-technical aspects that have an effect, above all, on the criteria for the decision, whose application through technical means does not present any problem.

Patent Claims

1. Method for providing energy supplies through a combined network (E), to which several consumers (C1, C2, ..., CM) and suppliers (P1, P2, ..., PN) are connected, with freely selectable relations between consumers and suppliers, characterized in that supply and acceptance of given amounts of energy are agreed upon between consumers and suppliers through data exchange, that each supplier feeds the agreed upon amounts of energy to the combined network and each consumer receives the agreed-upon amount of energy.

2. Public energy distribution system with an energy combined network (E), to which several consumers (C1, C2, ..., CM) and several suppliers (P1, P2, ..., PN) are connected, characterized in that a data network (D) is available, through which consumers and suppliers can exchange data with one another, and that consumers and suppliers are equipped with system components (SP, SC), which are connected to the energy combined network (E) as well as to the data network (D), that the system components (SC) have means (M) with the consumers (Ci), in order to determine the energy requirement at the moment, that they have means (CC) in order to agree on the acceptance of a given amount of energy with a selected supplier (Pj) through the data network (D), and that they have means (M, CC) in order to release a new agreement if the agreed-upon amount of energy has been received, and that the system components (SP) exhibit means (CC) with the

suppliers (Pj) in order to agree on the supply of a given amount of energy with consumers through the data network (D), and that they exhibit means (CC, M) in order to release the supply of the agreed upon amounts of energy.

3. System components (SC) for a consumer (Ci) in a public energy distribution system for connecting to an energy combined network (E), characterized in that the system components (SC) exhibits means (CC) for connecting to a data network (D), that it exhibits (M) in order to determine the energy requirement of the consumer (Ci) at the moment, that it exhibits means (CC) in order to agree with a supplier (Pj) on the acceptance of a given amount of energy through the data network, and that it exhibits means (CC, M) in order to release a new agreement when the agreed upon amount of energy has been received.

4. System components (SP) for a supplier (Pj) in a public distribution system for connecting to an energy combined network (E), characterized in that the system components (SP) exhibits means (CC) for connecting to a data network (D), that it has means (CC) in order to agree with consumers on the supply of a given amount of energy through the data network, and that it exhibits means (CC, M) in order to release the supply of the agreed upon amount of energy.

2 page(s) of drawings follow